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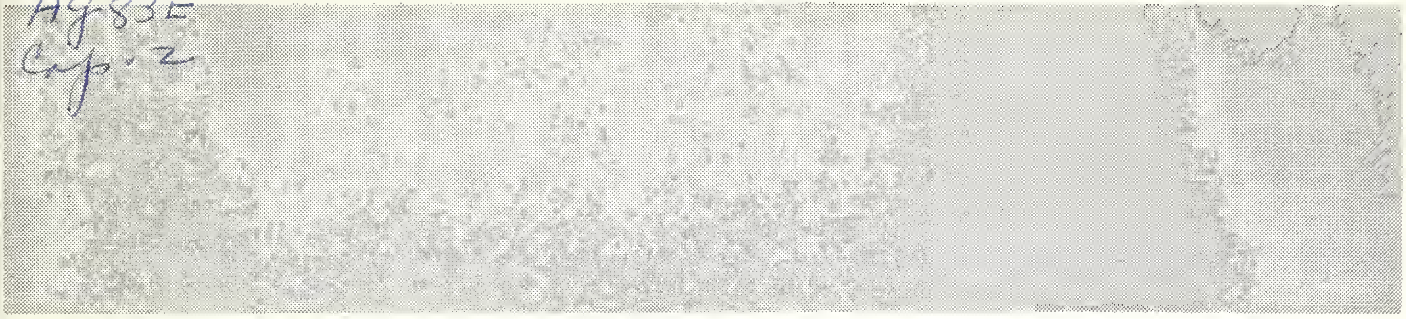

Economics of Segmenting Cattle Hides

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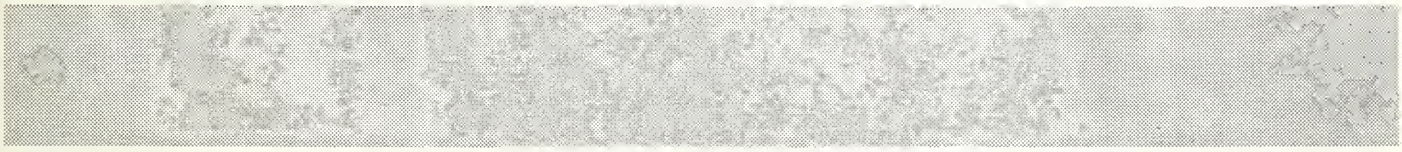

PREFACE

This research report evaluates the economic feasibility of trimming or segmenting hides (to be used in the manufacture of shoe uppers) into bends or crops in order to improve the competitive position of leather.

This study is part of a broad program of research being conducted by the Department of Agriculture to help farmers market their products.

Cattle producers have considerable interest in the future of leather; for if the value of hides decreases, returns to farmers for the most valuable byproduct of livestock slaughter also decrease. Presently, meat packers receive about $365 million annually for the hides and skins from livestock slaughter. Thus, as the markets for leather deteriorate, packers' loss of revenue from hides is reflected in lower farm prices for livestock or higher prices for meat.

This study was done in cooperation with the Research Committee of the American Leather Chemists Association, of which Dominic Meo, is Chairman. The authors are grateful to the numerous meat packers, dealers, brokers, tanners, and trade associations who cooperated in making data and information available. Special appreciation is given to the S. B. Foot Tanning Company and the Red Wing Shoe Manufacturing Company of Red Wing, Minn., and to Beggs and Cobb, Inc. of Boston, Mass., for their assistance in testing new hide-trimming practices and in validation of results.

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Washington, D.C. February 1965

SUMMARY

Analysis of new trimming practices indicates that the removal of bellies, heads, and shoulders from hides prior to tanning is economically advantageous to all segments of the leather industry. This was determined by the Department of Agriculture, in cooperation with the hide and leather industry, in evaluating the economics of changing hide-trimming practices in order to improve the quality and the competitive position of leather.

Current hide- and leather-trimming practices by packers, tanners, and shoe manufacturers reduce the area of a hide by about 20 percent. The proposed USDA hide trim is a one-time trim. This trim removes the belly and head (about 30 percent of the hide) prior to curing, and thus reduces curing charges. When a tannery pays about the same total price for a trimmed hide as it now pays for a conventional hide, increases in yield, weight, quality, and tanning efficiency are large enough to compensate for the cost of the portions removed. If the shoulder area, comprising about 20 percent of the hide, is also segmented prior to tanning, the back or bend leather should sell for about 9 cents per square foot more than conventional side leather. Improved yield and cutting rates make it possible for shoe manufacturers to pay a higher value for bend leather.

Previously, the hide and leather industry has held to the concepts that trimming of hides reduces returns and that it is necessary to market the whole hides to maximize profits. Therefore, all previous trimming practices attempted to minimize weight or area loss. The USDA hide trim attempts to maximize returns for hides and leather. This trim facilitates segmented marketing practices (product differentiation) and eliminates the need for compromising tannages, thereby producing better leather.

Results of a controlled experiment of the new trim indicate the yield of leather (square feet to pounds) from cropped sides is about 11 percent greater than the yield of leather from conventional sides, when the tannery input weight is balanced. If the shoulder is segmented, the yield from bends is about 9 percent greater than the yield from sides. The weight of leather is also more uniform when bellies are segmented from hides. Removal of bellies resulted in the remaining 80 percent of the leather grading 5- to 5 1/2-ounce leather. Segmenting of the shoulders resulted in all the leather grading 5- to 5 1/2-ounce weight. Quality of all the bend leather (except gusset) was upgraded about 25 percent and the finished surface was exceptionally uniform.

Overall tanning efficiency in processing bends and crops was increased 12 to 15 percent without changing equipment or labor requirements. For example, pasting 2 cropped sides increased pasting capacity 67 percent and pasting 4 bends doubled the capacity of the pasting operation. Dropoffs inside the dryer were eliminated, paste use was not increased, and the crops and bends were pasted in the same interval of time as were sides.

Cutting tests on bends by shoe manufacturers indicate total cutting costs can be reduced 10 to 20 percent. Large (work-shoe) patterns produce the same yield as expected from normal side-leather estimates. In cutting smaller patterns such as oxfords, or childrens' shoes, the cutting yield may be as high as 12 percent above that expected. Cutting rates for large patterns may increase 60 percent. However, these rates decrease when smaller types of shoes are cut.

ECONOMICS OF SEGMENTING CATTLE HIDES

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INTRODUCTION

The marketing of hides through leather products is big business. Sales of domestically manufactured leather products exceed $5 billion a year. Per capita expenditures for leather footwear are over $20 a year, and for other leather products, slightly over $9 a year. In addition, hide and skin exports have been increasing, to $82 million in 1963-64.

Nevertheless, since World War II the hide and leather industry has been in difficulty. Although there has been an increase in hide production, the production of shoes made with leather has not kept pace with growth in the U.S. population. The percentage of shoes made with nonleather materials has increased. Markets for other leather products have declined and imports of shoes and other leather products have increased. As a result, the hide and leather industry is confronted with the necessity of making changes in their marketing practices in order to meet the competition.

The hide and leather industry is one of the few segments of the economy which has not made major technological advances in recent years; nor has the industry been able to attain a high degree of mechanization. Removing hides, curing and tanning them, and manufacturing them into leather products is still basically a manual process requiring considerable labor. As a result, leather substitutes, manufactured in large quantities under automated conditions, are making strong inroads into formerly all-leather markets. Today, there are 15 recognized substitutes for leather, 14 of which sell for less than leather.

In a 1958 survey of 81 footwear manufacturers, over half the companies reported the basic disadvantages of leather--when used as a shoe-upper material--to be nonuniformity in quality and difficulty in handling during production. 1/ Therefore, it would appear that if quality and uniformity of leather could be improved, leather would maintain its superiority as a footwear material.

A primary difficulty in tanning and cutting leather for shoes is the irregular shape of a hide. A standard size or shape of hide and leather would reduce many processing and handling difficulties in tanning and shoe manufacturing, and would make possible more mechanization of tanning and faster shoe cutting.

The present practice in the side-upper leather industry is to market leather as sides or 2 halves of a hide. When tanning sides, it is virtually impossible to produce leather with uniform characteristics. Belly areas of hides are thinner, have more variability in temper and looser fiber orientation than do the back or bend portions

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1/ Levine, D. B., and Linstrom, Harold. Manufacturers' Opinions of Cotton and Leather Used in Shoes. U.S. Dept. Agr. Mktg. Res. Rpt. 392, April 1960.

of hides. These differences require different treatment in tanning if a uniform product is to be produced. Shoulders are generally wrinkly in nature and have the greatest number of surface defects. Instead of tanning each portion separately, and thus producing higher quality leather, tanners treat the entire side the same to produce a piece of leather with larger area.

To evaluate these significantly different new hide-marketing practices, the U.S. Department of Agriculture (USDA) conducted a controlled experiment on the tanning of segmented hides during the summer of 1964. Three experimental lots of hides were used for the test. The control lot consisted of conventional sides or 2 halves of a hide. The second lot, termed "crops," consisted of sides with the belly, shank, and head areas removed, and the third lot, called "bends," were sides with the head, shoulder, shank, and belly areas removed. A cropped side is about 67 percent of the weight of a conventional side, and a bend is about half the weight of a side. The tanned sides measured 22 square feet, crops, 16 square feet, and bends, 11 square feet in size.

All tanning operations were observed and pertinent data recorded. After tanning, the bends were taken to a shoe manufacturer for cutting. The results of the experiment were then correlated with the findings of another tanner who produces bends and crops of a similar nature. 2/

HIDE TRIMMING

Hides are trimmed by almost every marketing agency in the hide and leather industry. In the packinghouse, dewclaws, pizzles, ears, snouts, and tails are trimmed from hides. On entering a hide cellar for curing, each hide is given a second trim which removes 3 to 6 percent of it. If specified by the buyer, some hides are given an additional trim prior to shipping.

At the tannery, hides are unbundled and each is given a third trim which removes another 2 to 3 percent of the original hide. Throughout the tanning process, fringe areas are trimmed from hides. At the final grade-sort, the leather is given a fourth trim--generally in the pocket and head areas. In general, a tannery trims off about 8 to 10 percent of the original hide. Shoe manufacturers often trim pocket, head, or other fringe areas before the leather is given to shoe cutters. The net result of a little trimming by everyone amounts to about 20 percent of the original hide and increases processing costs for all the marketing agencies.

The USDA hide trim (fig. 1) is a one-time trim. The trim facilitates segmented marketing practices (product differentiation), improves quality, and reduces processing costs at all levels. The basic trim removes the heads, bellies, and shanks. This weight loss is about 30 percent of the green-hide weight and is slightly higher for cured hides.

It is recommended that the belly width be about 8 inches at the narrowest point, which is generally the pocket area of the front shank. An 8-inch belly width is recommended for 3 reasons: (1) All the belly area of the hide is removed, (2) belly tanners prefer an 8-inch minimum width and (3) splits from the bend area are more uniform in weight and shape. If the bellies are sold in a pickled state, the entire hide

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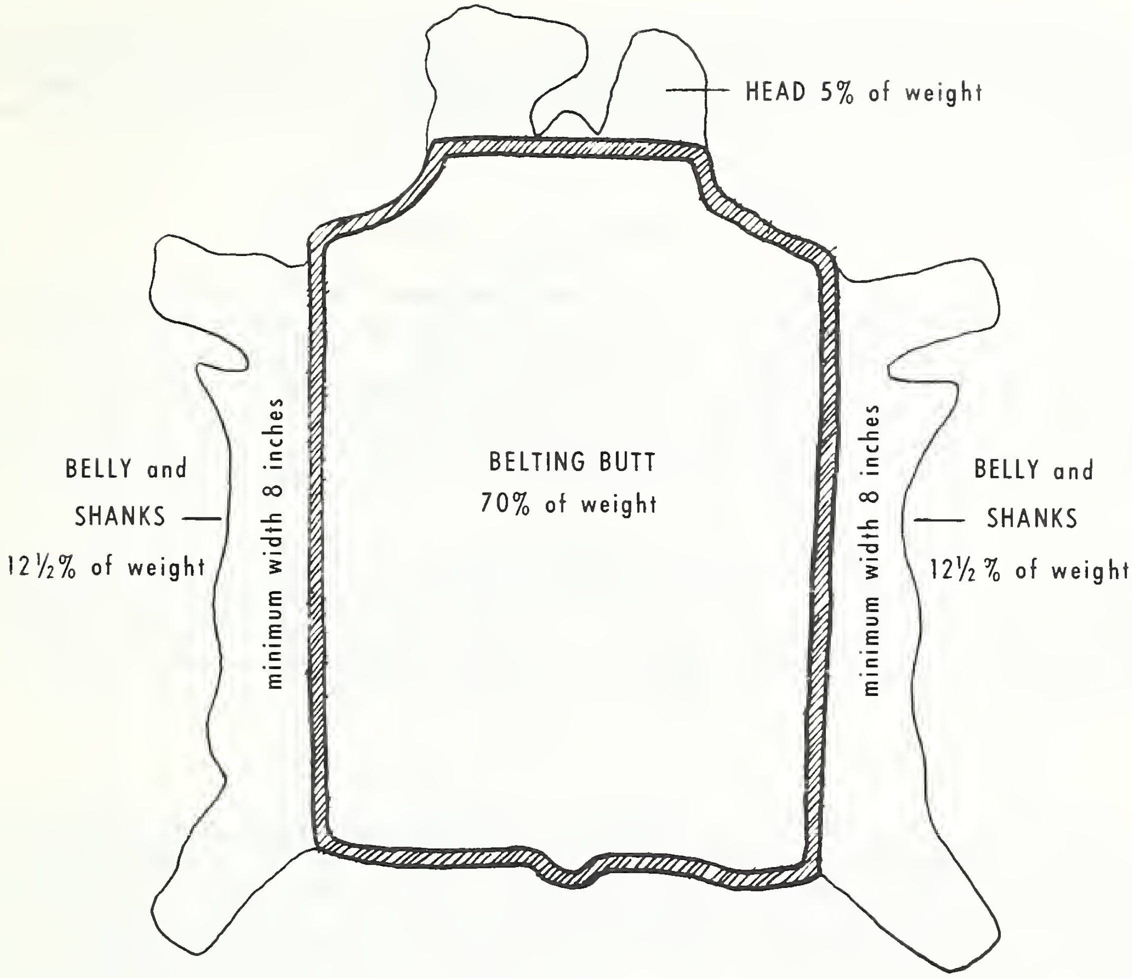
2/ Beggs and Cobb, Inc., Boston, Mass. The "crops," as sold by Beggs and Cobb, are conventional sides with the shoulders removed. The rear shanks are left on and about 6 percent of the belly area is removed. The crops measure about 14 square feet in size. (Mention of commercial firms does not constitute endorsement by the USDA.)


HEAD 5% of weight
BELLY and SHANKS 12½% of weight
minimum width 8 inches
BELTING BUTT 70% of weight
minimum width 8 inches
BELLY and SHANKS 12½% of weight

USDA HIDE TRIM PATTERN

Figure 1

must be beamed (hair removed) prior to cutting. Alternative uses for the parts which the USDA trim pattern removes are presented in a companion report.[3] This indicates packers can have higher economic returns from their hides by removing the bellies, heads, and trimmings before marketing them.

When the green hides are trimmed of bellies and heads, the remaining portion of the hide, termed "belting butt," is rectangular in shape and needs no further trimming. This portion of the hide is taken through tanning in the conventional manner. Test results indicate that this shape of trimmed hide improves the yield, quality, and tanning efficiency.

CURING AND BEAMING

The belting butt can be cured and marketed to the tanner the same way as conventional hides. However, there is currently a strong impetus to beam hides (remove hair) at the source of supply and thus eliminate curing costs. Also, beamed hides weigh less than cured hides; thus, freight costs are reduced. Although it has not been proven, some tanners believe that better leather can be produced from hides that are beamed fresh than from those that have been salt cured. Currently, there are 2 firms beaming fresh hides, and several more are anticipated by 1966.

After beaming, the hide is ready for tanning, and the tanner has several options (fig. 2). The width of equipment used in most tanneries limits the size of hide which can be processed. Therefore, the belting butt is cut down the backbone into 2 sides. The sides are termed "crops" when the bellies and shanks are removed. If the shoulder is to be marketed separately, a double shoulder is segmented first. Then, the belting butt is cut down the backbone to produce 2 bends.

BALANCING OF MATERIALS

In a test on the tanning of bends or cropped sides, the balancing of materials is of primary importance (table 1). Most tanneries put a specific weight of cured hides into process and the outturn of leather is measured in square feet. This input-output ratio of square feet to pounds is commonly referred to as the yield of leather. Costs for tanning are generally based on square feet of leather and not pounds of hides. Typical tanning costs are about 21 cents per square foot although special finishes may increase these costs to 35 cents. Theoretically, if a tannery would process bends (50 percent of a hide), total tanning costs would be cut in half. This would be true if tanning costs were a 1 to 1 relationship to square feet.

In practice, tanning costs are not on a fixed ratio and reducing the whole hide area by 50 percent (bends) or 30 percent (crops) does not reduce tanning costs by an equivalent amount. Owing to a large number of variables in tanning, a sizeable test over a long period of time would be required to determine tanning cost for bends or crops. This problem can be overcome by balancing the input weight of bends or cropped sides to the weight of conventional sides. For example, if a bend is 50 percent of the weight of a side, a tannery can double the weight of bends or put 2 bends into process for every 1 side. When processing cropped sides, one-third of the hide is removed. Thus, the tannery would balance the hide input by adding one-third more crops. Tanning costs for bends can then be compared with those for conventional sides.

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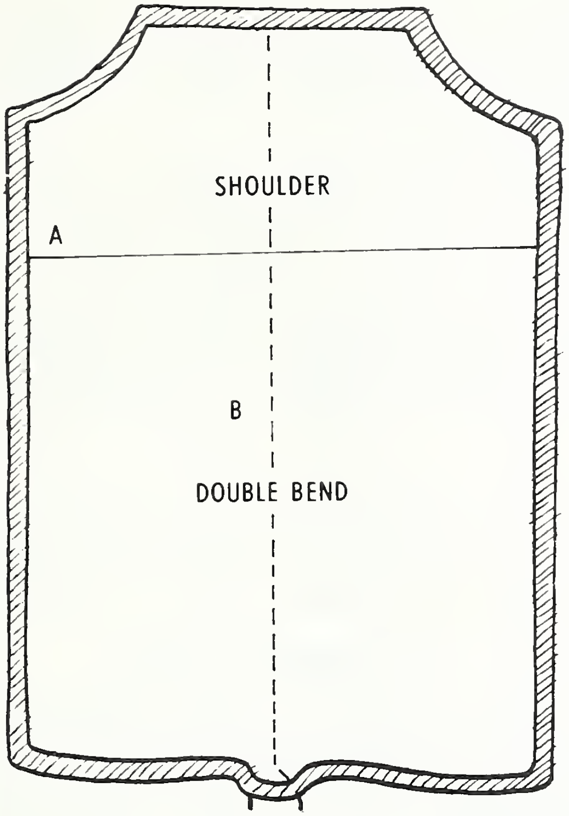
[3] Poats, F. J., and Thompson, John W. Alternative Markets for Cattle Hide Trim. U.S. Dept. Agr., ERS-217, Feb. 1965.



USDA OPTIONAL CUTTING PATTERNS

1. Cut along line A to make a double shoulder and a double bend.
2. Cut along line B (back bone) to make 2 cropped sides.
3. Cut along line A and then along line B from tail to line A to make 2 bends and a double shoulder.
4. Cut along lines A and B, making 2 bends and 2 single shoulders.

Figure 2

Table 1.--A model of material balances for whole hides and hide segments 1/

Material	Unit	100 hides	149 hides for cropping bellies 2/	200 hides for cutting bends 3/
Hide input:				
Green-hide weight (72 lbs.)	Pounds	7,200	10,728	14,400
Cured-hide weight (60 lbs.)	Pounds	6,000	8,940	12,000
Fleshed-hide weight 4/	Pounds	4,800	7,164	9,600
Receiving weight (2 percent tare)	Pounds	4,704	7,110	9,408
Salt, rope, and trimming loss (5 percent) 5/	Pounds	235	363	470
Hide weight before cutting	Pounds	4,469	6,474	8,938
Hide cutting:				
Bellies (25 percent)	Pounds	---	1,898	2,234
Shoulders (20 percent)	Pounds	---	---	1,788
Heads (5 percent)	Pounds	---	380	447
Total weight removed	Pounds	---	2,278	4,469
Tannery input weight	Pounds	4,469	4,469	4,469
Tannery output:				
Blue chrome splits	Pounds	620	633	780
Leather	Sq.ft.	4,416	5,088	4,896
Yield-sq. ft. to cured hides less cutting 6/	Percent	74	85	82

1/ Figures rounded.

2/ Bellies and heads to be removed after purchase.

3/ Bellies, heads, and shoulders to be removed after purchase.

4/ Fleshing factor, 80 percent.

5/ Salt and rope, 2 percent; trimming, 3 percent.

6/ The yield based on receiving weight less cutting. Yield of whole hides is low because of trimming losses in the tanning process. Cropped hides yield higher than bends because of the increase in the shoulder area during pasting.

YIELD OF LEATHER

The yield of leather (square feet to pounds) from cured unfleshed hides trimmed at the tannery was 74 percent for sides, 85 percent for cropped sides, and 82 percent for bends (table 1). The tannery input weight was balanced at 4,469 pounds for the sides, cropped sides, and bends. The lower yield from conventional sides was primarily the result of continual trimming throughout the tanning process and at final sort. The yield of cropped sides was greater than the yield of bends because the shoulder area stretched more in pasting and staking.

The leather was split after tanning in order to produce 5- to 5 1/2-ounce (HH weight) leather. The weight of the blue chrome splits from 200 conventional sides was 620 pounds; from 298 cropped sides, 633 pounds; and from 400 bends, 780 pounds (table 1).

WEIGHT AND QUALITY OF LEATHER

The weight or thickness of leather is determined primarily by the type of hide. In general, the thinner the hide, the lighter the weight of leather. Currently, there is a strong demand for heavyweight (5- to 5 1/2-ounce) leather for unlined and moccasin-type shoes. "Spready," or thin hides, do not produce heavyweight leather. As shown in table 2, conventional sides in the test produced less than 50-percent HH weight leather. About 80 percent of the cropped sides produced HH weight and all of the bends produced HH weight leather. The primary factor contributing to the increase in the weight of leather was the removal of bellies, which are always the thinnest portion. To maintain an even thickness throughout a side, tanners generally split the bend area of a hide to the thinnest portion of a belly.

More hide defects, such as wrinkles and scratches, occur in the shoulder area than in any other portion of a hide. Removing shoulders makes it possible to upgrade bend leather. As shown in table 3, 25 percent of all No. 4 leather can be upgraded to No. 1, 2, or 3 leather. Test results also indicated an upward shift in the quality of No. 2 and 3 leather, but the amount of improved quality could not be adequately measured. Based on similar tests by another tanner, all leather can be upgraded about 25 percent (see footnote 2). Grading results indicate No. 5, or gusset leather, remains gusset leather regardless of whether shoulders or bellies are removed (table 3).

At the time of the test, the sides, bends, and crops were graded immediately after beaming and at the final sort. Results indicate that a grader can determine No. 4 hides after beaming with at least 95 percent accuracy. Thus, it is not necessary to tan poor quality hides which do not cover processing costs.

TANNING EFFICIENCY

The transforming of cured hides into finished leather is basically a manual operation. The greatest deterrent to mechanization of tanning has been the irregular shape of a hide. This same irregular shape also works to the disadvantage of shoe cutters who must spend more time orientating the leather on cutting tables and need more skill to cut poor portions of hides such as bellies, shanks, or heads. Although belly leather is almost always free of surface blemishes, it is also the weakest type of leather because of fiber orientation.

Tanning efficiency can be increased 12 to 15 percent without making any equipment or labor changes when hides are trimmed in a rectangular pattern. In this instance, tanning efficiency lowered fixed and variable costs such as labor, equipment and materials, and overhead. Following are some of the primary processing steps in tanning where efficiency can be improved, thereby lowering costs.

Trimming: Tannery trimming operations were reduced from multiple to one-time trim, but man-hour requirements for the one-time trim were increased by 80 percent. If hides are trimmed at the packinghouse, tannery trimming can be eliminated.

Beaming: Thinness and irregular shapes in belly areas often make it necessary to pass sides through an unhairing machine more than once. Removing bellies reduced unhairing time 20 percent.

Wringing: Wringing was speeded up 25 percent with cropped sides, and 50 percent with bends. Wrinkling was eliminated. A straight-through wringer would reduce labor requirements even more.

Table 2.--Weight of leather expected from heavy-hide selections with spready characteristics when they are marketed as sides, cropped sides, or bends

Weight designation		Sides	Cropped sides	Bends
Grade	Ounces	Percent		
HH	5-5 1/2	49	80	100
H	4 1/2-5	22	16	---
HM	4-4 1/2	18	4	---
M	3 1/2-4	11	--	---
Total		100	100	100

Table 3.--Grade of full-grain leather expected from heavy-hide selections when they are marketed as sides, cropped sides, or bends

Grade designation	Sides	Cropped sides	Bends 1/
	Percent		
Nos. 1, 2, 3	50	50	63
No. 4	30	30	17
No. 5, gussett	20	20	20
Total	100	100	100

1/ At the 95-percent confidence level, 25 percent of all No. 4 leather can be upgraded into No. 1, 2, or 3 leather by cutting off the shoulders.

Tanning, dyeing, and fat-liquoring: Drums can handle 12 to 15 percent more material per load and chemical losses are reduced.

Splitting: Splitting rates can be increased 80 percent for bends and 20 percent for cropped sides.

Shaving: Crops and bends did not usually need to be shaved. If shaving is needed, a wide shaver can handle bends and crops at increased rates.

Pasting: Sides were pasted 44 square feet of leather per frame. Four cropped sides increased frame capacity of 64 square feet. Eight bends increased capacity to 88 square feet. Dropoffs inside the dryer were eliminated. Paste use per frame was not increased. Rate of pasting was 2 minutes per frame. On sides, 1 minute was used to trim, one-half minute to smooth out pocket and fringe areas, and one-half minute to paste the bend area of the sides. Two cropped sides or 4 bends were pasted in the same interval of time.

Staking: No change.

Finishing: Machine capacity was increased 100 percent, but labor requirements were doubled.

Plating: Capacity in feet per hour was increased about 10 percent.

Final sort: Observations indicate more time was taken to trim sides than to grade leather.

The trimming losses that occur at the final sort in a side-leather tannery are very costly. In the experimental test, 20 pounds of 5 1/2-ounce leather were trimmed per 100 sides. This is equivalent to about 60 square feet of leather. At 40 cents per square foot for hide and tanning charges, this represents about a $24 loss per 100 sides.

Packaging and wrapping: Labor requirements would be lessened by the use of cardboard boxes and shipping pallets. Bends can be stacked flat in a box or on a pallet. Cropped sides can be folded over a mailing tube in lots of 10 and laid in boxes of the same size as used for bends.

The foregoing factors give effect of shape on primary tanning operations, but other indirect advantages may result. For example, crops or bends can be more easily palletized and moved through the tannery in larger size lots. Storage requirements are reduced and the number of lots can be increased, thereby increasing leather output. Also, packaging, storing, shipping, and inventroy control within a tannery are improved when bellies are removed. Assuming a tannery converted over completely to cropped sides or bends, equipment could be substantially altered. Most equipment in modern tanneries today will handle at least 50-inch widths and some equipment, 60- to 72-inch widths. If cropped sides or bends were processed, the width of tanning equipment could be reduced to 30 inches, thereby reducing capital investment. Conversely, many tanners might find it more feasible to process double bends or belting butts than sides.

In summation, the trimming of hides into a rectangular shape is necessary if tanning is to be mechanized. The removal of bellies will make it possible for tanners to reduce labor costs through lower labor requirements and at the same time to increase the amount of leather going through the plant, without increasing equipment requirements. The removal of shoulders will result primarily in quality improvement of leather.

TANNERY RETURNS FOR SIDE, CROP, AND BEND LEATHER

Assuming a tannery purchases cured hides, removes the bellies and heads, and receives no value for the trimmed portions, monetary returns for the crops are almost the same as returns for sides (table 4). If the tannery purchases hides, cuts them into bends, and receives no value for the trimmed portions, then bends should sell for about 9 cents more per square foot than side leather in order to equal tannery returns (table 4). This assumes cured hides sell for 12 cents a pound and side leather for 40 cents a square foot. These examples indicate that if a tannery pays the same value for a crop as it pays for a conventional side, increases in yield, efficiency, and value of splits can compensate for the cost of the portions removed. If a value for improvement in quality and weight of leather were included in the examples, the effect of processing crops or bends would be further enhanced.

Additional cost models were developed to determine the effect of trimming hides at various marketing levels (appendix tables 1-4). Some cost models credited tanners, or packers with returns from the trimmings. A summation of tannery returns for crops and bends trimmed at the various marketing levels is shown in table 5. Analysis indicated that the best place to trim hides is at the packinghouse or hide cellar prior to curing. If a byproduct allowance for trimmings can be recovered

Table 4.--Imputed factory cost of side, crop, and bend leather when cured hides are trimmed at the tannery and no value is credited for trimmings 1/

Item balances	Unit	100 hides	149 hides for cropping bellies 2/	200 hides for cutting bends 3/
Tannery input:				
Hide weight cured	Pounds	6,000	8,940	12,000
Hide weight fleshed 2/	Pounds	4,800	7,164	9,600
Hide weight of trimmings 3/	Pounds	331	2,695	5,131
Hide weight for tanning	Pounds	4,469	4,469	4,469
Tannery costs:				
Cured hides at 12 cents per lb.	Dollars	720	1,075	1,440
Fleshed hides at 15 cents per lb.	Dollars	900	1,341	1,800
Brokerage at .5 cent per lb.	Dollars	24	36	48
Freight at $1.25 per cwt.	Dollars	60	100	120
Tannery hide costs 4/	Dollars	804	1,211	1,601
Tanning costs 5/	Dollars	998	998	998
Tannery output:				
Blue chrome splits	Pounds	620	633	780
Yield of leather	Sq. ft.	4,416	5,088	4,896
Imputed tannery returns:				
Blue chrome splits 6/	Dollars	37	57	70
Factory leather value 7/	Dollars	1,765	2,152	2,529
Factory price per sq. ft. 8/	Cents	40.0	42.3	51.7
Credit for increase in tannery efficiency 9/	Cents	0.0	+2.7	+2.7
Imputed factory cost for leather 10/	Cents	40.0	39.6	49.0

1/ Figures rounded.
2/ Fleshing factor, 80 percent.
3/ Includes salt, rope, and tare allowance.
4/ Summation of fleshed hide, brokerage, and freight costs.
5/ Tanning costs of 22.6 cents per square foot are based on conventional hides and held constant for crops and bends of the same input weight.
6/ Blue chrome split value, 6 cents per pound on hides and 9 cents per pound on crop and bend splits.
7/ Sum of hide and tanning costs less the value of blue chrome splits.
8/ Factory leather value divided by square feet.
9/ Increase in tannery efficiency estimated at 12 percent on tanning costs of conventional hides and held constant for cropped hides and bends.
10/ Does not include credit for grade or quality improvement.

at any place in the marketing system, then the additional value needed for bend leather is reduced.

Table 5.--Imputed factory value needed for crop or bend leather under various marketing conditions to provide returns equal to side leather selling for 40 cents a square foot 1/

Method of marketing	Selling price of crops per square foot	Selling price of bends per square foot
	Cents	
Packer trimming of green hides:		
No credit for trimmings	38.7	47.4
Credit for trimmings	37.3	44.4
Tannery trimmings of cured hides:		
No credit for trimmings	39.6	49.0
Credit for trimmings	38.1	46.9
Credit for pickled trimmings	38.9	44.7

1/ Based on cured-hide price of 12 cents a pound, tanning cost of 22.6 cents a square foot, and side-leather price of 40 cents a square foot. Detailed material and cost balances are given in the appendix tables 1-4 and text tables 1 and 4.

PRICING BEND LEATHER

Side-upper leather is currently sold for an average price per square foot. When side leather sells for 50 cents a square foot, the belly, shoulder, and bend portions of the side are all sold for the same price. However, if the side is segmented, the various segments have different values. Bend leather is worth more than the average price while the belly and shoulder leather is worth less than the average price.

Based on current market prices of shoulder, belly, and head leather, the theoretical value of bend leather is 68 cents per square foot (table 6). If hides are cut into bends prior to tanning, the value of bend leather need only be about 60 cents per square foot to provide equal returns. This is 8 cents less than the theoretical value, but only 10 cents per square foot more than ordinary side leather. Current market quotations for bend leather are 10 cents per square foot above the price of conventional sides.

The final selling price of bends or cropped sides will be determined by supply, demand, and experiences of tanners and shoe manufacturers. However, based on cutting tests by shoe manufacturers, it appears that they also have a profit incentive for purchasing leather in the form of bends.

Table 6.--Imputed value of bends (based on current market values for other portions of a hide)

Item	Portions of a whole hide	Leather	Price per square foot	Total value
	Percent	Sq. ft.	Cents	Dollars
Conventional hide:				
2 sides	100	44.0	.50	22.00
Segmented hide:				
Head	5	2.2	.24	.53
Belly	25	11.0	.24	2.64
Double shoulder	20	8.8	.44	3.87
Bends	50	22.0	1/.68	14.96
Total	100	44.0	---	22.00

1/ Imputed.

SHOE MANUFACTURERS' CUTTING YIELDS AND RATES

Cutting tests on bends by shoe manufacturers indicate total shoe-cutting costs can be reduced 10 to 20 percent. Tests were not made on the USDA cropped sides. However, "crops" give about the same result as do bends (see footnote 2). Currently, there are 10 shoe manufacturers cutting shoes from bends or crops.

Based on the cutting tests on bends, large (work-shoe) patterns produce the same yield as expected from normal side-leather estimates. When smaller sized patterns such as oxfords are made, the yield increases. Cutting oxfords or loafers, an increase of 7 to 10 percent in the cutting yield is expected. Childrens' shoes may cut as high as 12 percent above the scale of 100.

The rate of cutting is also increased when bends are used. The cutting rate for large-size patterns such as work shoes can be increased by 60 percent. This rate will decrease when smaller types of shoes are cut. Other reactions by shoemakers, summarized below, indicate the desirability of cutting bends:

(1) Less skill by cutters is needed to provide the same or better quality output.

(2) Variations in cutters' speeds can be reduced.

(3) Largest cutting losses occur in the head, shank, and belly area.

(4) Heads, bellies, and shanks are the most costly portions of hides to cut.

(5) The higher the factory value of shoes, the greater the economic advantage of cutting bends.

(6) More uniform quality and grade of component parts for shoes are maintained.

(7) Rejects are reduced.

(8) Bends can be more easily stored and transported to cutters.

(9) Better inventory control can be maintained.

(10) The rectangular shape of bends helps overcome psychological advantages claimed by leather substitute advertisers.

It appears that several processing efficiencies might be possible in handling bends or crops in a shoe factory. The incoming leather could be more easily stored and transported to cutters. If bends were shipped flat in boxes or on pallets, loss of leather from fold damage would be eliminated. Also, multilayer or gang cutting may be feasible. One shoe manufacturer reported that every fourth hide he received had a break in the shoulder area caused by folding.

Based on the findings of this study, all the marketing agencies in the hide and leather industry can benefit by adopting new hide-trimming and marketing practices. Shoe manufacturers can benefit through lower cutting costs, while tanners have increased yield and tanning efficiency. Packers or hide dealers receive the same value for a trimmed hide as they do for a conventional hide, but their curing charges are reduced. The entire industry and the consumer benefit through improved leather quality. Therefore, an overall plan for adoption of new leather marketing practices is presented.

ADOPTION OF NEW MARKETING PRACTICES

Theoretically, the best marketing practice should begin with the removal of belly and head as soon as possible after the hide is removed from an animal. If possible, the bellies should be diverted to edible uses and other trimmings rendered for oil and protein feed.

A one-time trim of fresh hides will eliminate the need for additional trimming and, thereby, reduce all marketing charges. Costs for beaming, curing, and transporting hides will also be reduced. After removing belly and head, the remaining portion of the hide (belting butt) should be taken to a beamhouse for fleshing, unhairing, bating, and pickling.

The beamhouse should be located near the packinghouse so that hides can be transported to the beamhouse and processed before deterioration of the hides begins. Although the primary function of the beamhouse is to remove the hair and prepare hides for tanning; the sorting, grading, and segmenting of the hides is a second important marketing function of a beamhouse. As part of the beamhouse operation, the hides should be segmented into bends and double shoulders for marketing. Poor quality or defective segments should be discarded or marketed for glue, gelatin, or similar products. If the belting butt is not segmented at the beamhouse, the tanner can exercise the option of segmenting it.

The segmenting of a hide after beaming but prior to tanning has several advantages: (1) Poor quality rawstock which may not cover tanning costs can be eliminated, (2) each of the segmented portions can be marketed for specific purposes such as full-grain or corrected-grain leather, and (3) more standardization of tanning techniques is possible when bends or shoulders are processed separately. This results in improvement in the quality of leather. If the shoulder is removed and discarded prior to tanning, a higher value must be charged to shoe manufacturers for bend leather. Currently, the market for bend leather may not be large enough to warrant the segmenting of a large number of shoulders. However, lower prices for hides or shoulder leather would increase the economic feasibility of removing and discarding shoulders prior to tanning.

In actual practice, it is doubtful that all bellies or shoulders will be removed from hides prior to tanning. Upholstery tanners usually need the largest sized piece of leather that can be made. Belly tanners do not have beamhouses and purchase bellies in the pickled state. An export demand for trimmed or segmented hides may not materialize and packers or hide dealers with a small volume of hides may not find it economically feasible to trim or segment hides. Therefore, some hides will continue to be marketed in the conventional manner.

There is one possible exception to the theory that small packers or dealers may not find it economical to trim or segment hides. Removing the shoulders and bellies from country, locker-butcher, or renderer hides may improve the quality of the hides to a greater degree than the trimming of "big" packer hides.

Appendix Table 1.--Imputed factory cost of side, crop, and bend leather when hides are trimmed at the packinghouse prior to curing and no value is credited for trimmings 1/

Item	Unit	100 hides	149 hides for cropping bellies	200 hides for cutting into bends
Packinghouse:				
Green-hide weight	Pounds	7,200	10,728	14,400
Trimming and cutting loss 2/	Pounds	---	3,528	7,200
Weight prior to curing and fleshing	Pounds	7,200	7,200	7,200
Weight after curing	Pounds	6,000	6,000	6,000
Tannery input:				
Weight after fleshing	Pounds	4,800	4,800	4,800
Total hide cost	Dollars	720	1,080	1,440
Freight at $1.25 per cwt	Dollars	60	60	60
Brokerage at 50 cents per cwt	Dollars	24	24	24
Tannery costs:				
Tannery hide cost 3/	Dollars	804	1,164	1,524
Tanning cost 4/	Dollars	998	998	998
Tannery output:				
Yield of leather	Sq. ft.	4,416	5,088	4,896
Byproduct value of splits 5/	Dollars	37	57	70
Factory imputed leather value 6/	Dollars	1,765	2,105	2,452
Factory price per sq. ft.	Cents	40.0	41.4	50.1
Credit for increase in tannery efficiency 7/	Cents	0.0	+2.7	+2.7
Imputed factory cost of leather 8/	Cents	40.0	38.7	47.4

1/ Figures rounded.

2/ No byproduct value for the tanner. It is estimated that at least 2 cents per pound can be recovered by the packer for the portions removed, by recovering the oil and protein.

3/ Based on 15 cents per pound fleshed hide plus brokerage fee and freight.

4/ Tanning costs of 22.6 cents per square foot including profit are based on conventional hides and held constant for cropped sides and bends of same input weight.

5/ Weight of blue chrome splits from 100 hides, 620 pounds (at 6 cents per pound); cropped hides, 633 pounds, and bends, 780 pounds (at 9 cents per pound).

6/ Sum of hide costs and tanning costs less value of blue chrome splits.

7/ Estimated at 12 percent.

Appendix Table 2.--Imputed factory cost of side, crop, and bend leather when green hides are trimmed at the packinghouse prior to curing and a value is credited for trimmings 1/

Item	Unit	100 hides	149 hides for cropping bellies	200 hides for cutting into bends
Packinghouse:				
Green-hide weight	Pounds	7,200	10,728	14,400
Trimming and cutting loss 2/	Pounds	---	3,528	7,200
Weight prior to curing and fleshing	Pounds	7,200	7,200	7,200
Weight after curing	Pounds	6,000	6,000	6,000
Tannery input:				
Weight after flehsing	Pounds	4,800	4,800	4,800
Total hide cost	Dollars	720	720	720
Credit for trimmings at 2 cents per lb.	Dollars	---	70	144
Freight at $1.25 per cwt	Dollars	60	60	60
Brokerage at 50 cents per cwt	Dollars	24	24	24
Tannery costs:				
Tannery hide costs 3/	Dollars	804	1,094	1,380
Tanning costs 4/	Dollars	998	998	998
Tannery output:				
Yield of leather	Sq. ft.	4,416	5,088	4,896
Byproduct value of splits 5/	Dollars	37	57	70
Factory imputed leather value 6/	Dollars	40.0	40.0	47.1
Factory price per sq. ft.	Cents			
Credit for increase in tannery efficiency 7/	Cents	0.0	2.7	2.7
Imputed factory cost for leather	Cents	40.0	37.3	44.4

1/ Figures rounded.

2/ No byproduct value for the tanner. It is estimated that at least 2 cents per pound can be removed by the packer for the portions removed by recovering the oil and protein.

3/ Based on 15 cents per pound fleshed hide, plus brokerage fee and freight, less value of trimmings.

4/ Tanning costs of 22.6 cents per square foot including profit are based on conventional hides and held constant for cropped sides and bends of same input weight.

5/ Weight of blue chrome splits from 100 hides, 620 pounds (at 6 cents per pound); cropped hides, 633 pounds, and bends, 780 pounds (at 9 cents per pound).

6/ Sum of hide costs and tanning costs less value of blue chrome splits.

7/ Estimated at 12 percent.

Appendix Table 3.--Imputed factory cost of side, crop, and bend leather when cured hides are trimmed at the tannery and a value is credited for the trimmings 1/

Item	Unit	100 hides	149 hides for cropping bellies 2/	200 hides for cutting bends 3/
Tannery input:				
Hide weight cured	Pounds	6,000	8,000	12,000
Hide weight fleshed 2/	Pounds	4,800	7,164	9,600
Hide weight of trimmings 3/	Pounds	331	2,695	5,131
Hide weight for tanning	Pounds	4,469	4,469	4,469
Tannery costs:				
Cured hides at 12 cents per lb.	Dollars	720	1,075	1,440
Fleshed hides at 15 cents per lb.	Dollars	900	1,341	1,800
Brokerage at .5 cent per lb.	Dollars	24	36	48
Freight at $125 per cwt.	Dollars	60	100	120
Tannery hide costs 4/	Dollars	804	1,211	1,601
Tanning costs 5/	Dollars	998	998	998
Tannery output:				
Blue chrome splits	Pounds	620	633	780
Yield of leather	Sq. ft.	4,416	5,088	4,896
Imputed tannery returns:				
Trimmings at 2 cents per lb.	Dollars	0.0	74	103
Blue chrome splits 6/	Dollars	37	57	70
Factory leather value 7/	Dollars	1,765	2,078	2,426
Factory price per sq. ft. 8/	Cents	40.0	40.8	49.6
Credit for increase in tannery efficiency 9/	Cents	0.0	2.7	2.7
Imputed factory cost for leather 10/	Cents	40.0	38.1	46.9

1/ Figures rounded.

2/ Fleshing factor, 80 percent.

3/ Includes salt, rope, and tare allowance.

4/ Summation of fleshed hide, brokerage, and freight costs.

5/ Tanning costs of 22.6 cents per square foot are based on conventional hides and held constant for crops and bends of the same input weight.

6/ Blue chrome split value, 6 cents per pound on hides and 9 cents per pound on crop and bend splits.

7/ Sum of hide and tanning costs less the value of blue chrome splits and trimmings.

8/ Factory leather value divided by square feet.

9/ Increase in tannery efficiency estimated at 12 percent on tanning costs of conventional hides and held constant for cropped hides and bends.

10/ Does not include credit for grade or quality improvement.

Appendix Table 4.--Imputed factory cost of side, crop, and bend leather when hides are trimmed after beaming at the tannery and a value is credited for the pickled stock sold 1/

Item	Unit	100 hides	149 hides for cropping bellies	200 hides for cutting into bends
Tannery input:				
Cured-hide weight	Pounds	6,000	8,940	12,000
Hide weight fleshed	Pounds	4,800	7,164	9,600
Tannery input weight 2/	Pounds	4,469	6,747	8,938
Hide cost 3/	Dollars	804	1,211	1,601
Beamhouse cost at 3 cents per lb.	Dollars	134	202	268
Total cost of hides and beaming	Dollars	938	1,414	1,869
Byproduct allowance: 5/				
Bellies at 6 cents per lb.	Dollars	---	89	104
Shoulders at 16 cents per lb.	Dollars	---	---	224
Heads at 5 cents per lb.	Dollars	---	16	16
Total byproduct allowance	Dollars	0.0	105	344
Value of hides after pickle 6/	Dollars	938	1,309	1,525
Tanning and finishing costs 7/	Dollars	864	864	864
Tannery output:				
Yield of leather	Sq. ft.	4,416	5,088	4,896
Byproduct value of splits 8/	Dollars	37	57	70
Factory imputed leather value 9/	Dollars	1,735	2,089	2,292
Factory price per sq. ft.	Cents	40	41.6	47.4
Credit for increase in tannery efficiency 10/	Cents	0.0	2.7	2.7
Imputed factory costs for leather 11/	Cents	40.0	38.9	44.7

1/ Figures rounded.

2/ Fleshed hide weight less 2 percent tare allowance, 2 percent salt and rope loss, and 3 percent trimming loss.

3/ Based on 15 cents per pound fleshed hide plus brokerage fee and freight.

4/ Pickled weight of byproducts is 78 percent of fleshed weight.

5/ Weights of the byproduct.

6/ Sum of total hide and beaming cost less byproduct value for pickled stock.

7/ Estimated at 19.6 cents on whole hides and held constant for cropped sides and bends.

8/ Weight of blue chrome splits from 100 conventional hides, 620 pounds (at 6 cents per pound); cropped hides, 633 pounds, and bends, 780 pounds (at 9 cents per pound).

9/ Sum of value of hides after pickle and tanning costs, less the value of blue chrome splits.

10/ Increase in tannery efficiency estimated at 12 percent.

11/ Does not include credit for grade or quality improvement.

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